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NATIONAL DAM SAFETY PROGRAM. MOORE DAM, (INVENTORY NUMBER VA 14--ETC(U)
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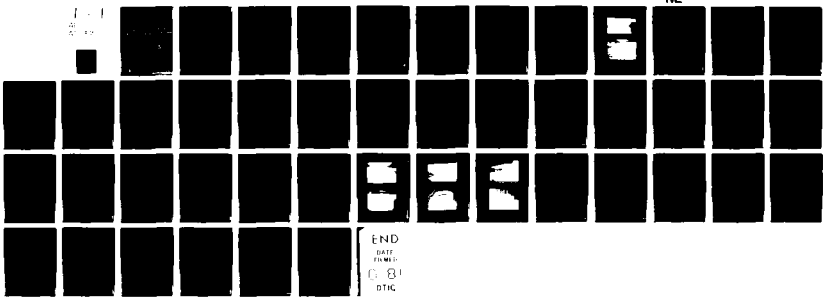


ROANOKE RIVER BASIN

BS

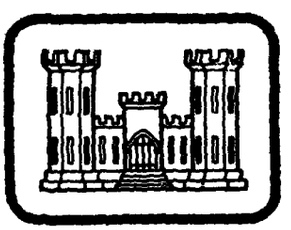
LEVEL II

Name Of Dam: MOORE

Location: PITTSYLVANIA COUNTY

Inventory Number: VA 14323

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM



PREPARED BY
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IN CONJUNCTION WITH

COMMONWEALTH OF VIRGINIA
STATE WATER CONTROL BOARD

FEBRUARY 1981

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20. Abstract

Pursuant to Public Law 92-367, Phase I Inspection Reports are prepared under guidance contained in the recommended guidelines for safety inspection of dams, published by the Office of Chief of Engineers, Washington, D. C. 20314. The purpose of a Phase I Inspection is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the gereral conditions of the dam is based upon available data and visual inspection. Detailed investigation and analyses involving topographic mapping, subsurface investigations, testing, and detailed computational evaluations are beyond the scope of a Phase I investigation; however, the investigation is intended to idenify any need for such studies.

Based upon the field conditions at the time of the field inspection and all available engineering data, the Phase I report addresses the hydraulic, hydrologic, geologic, geotechnic, and structural aspects of the dam. The engineering techniques employed give a reasonably accurate assessment of the conditions of the dam. It should be realized that certain engineering aspects cannot be fully analyzed during a Phase I inspection. Assessment and remedial measures in the report include the requirements of additional indepth study when necessary.

Phase I reports include project information of the dam appurtenances, all existing engineering data, operational procedures, hydraulic/hydrologic data of the watershed, dam stability, visual inspection report and an assessment including required remedial measures.

ROANOKE RIVER BASIN

NAME OF DAM: MOORE DAM
LOCATION: PITTSYLVANIA COUNTY, VIRGINIA
INVENTORY NUMBER: VA 14323

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM

PREPARED BY
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IN CONJUNCTION WITH

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PREFACE

This report is prepared under guidance contained in the Recommended Guidelines for Safety Inspection of Dams, for Phase I Investigations. Copies of these guidelines may be obtained from the Office of the Chief of Engineers, Washington, D.C. 20314. The purpose of a Phase I investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general condition of the dam is based upon available data and visual inspections. Detailed investigation and analyses involving topographic mapping, subsurface investigations testing, and detailed computational evaluations are beyond the scope of a Phase I investigation; however, the investigation is intended to identify any need for such studies.

In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team. In cases where the reservoir was lowered or drained prior to inspection, such action, while improving the stability and safety of the dam, removes the normal load on the structure and may obscure certain conditions which might otherwise be detectable if inspected under the normal operating environment of the structure.

It is important to note that the condition of a dam depends on numerous and constantly changing internal and external conditions, and is evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the condition of the dam at some point in the future. Only through continued care and inspection can there be any chance that unsafe conditions be detected.

Phase I inspections are not intended to provide detailed hydrologic and hydraulic analyses. In accordance with the established guidelines, the spillway design flood is based on the estimated "Probable Maximum Flood" for the region (flood discharges that may be expected from the most severe combination of critical meteorologic and hydrologic conditions that are reasonably possible), or fractions thereof. Because of the magnitude and rarity of such a storm event, a finding that a spillway will not pass the design flood should not be interpreted as necessarily posing a highly inadequate condition. The design flood provides a measure of relative spillway capacity and serves as an aide in determining the need for more detailed hydrologic and hydraulic studies, considering the size of the dam, its general condition and the downstream damage potential.

PHASE I REPORT
NATIONAL DAM SAFETY PROGRAM

BRIEF ASSESSMENT OF DAM

Name of Dam:	Moore Dam
State:	Virginia
Location:	Pittsylvania County
USGS Quad Sheet:	Brosville, Virginia - N.C.
Stream:	McGuff Creek
Date of Inspection:	26 February 1981

The Moore Dam is an earthfill structure about 400 feet long and 22.7 feet high with a private roadway traversing the dam. The dam is owned and maintained by Mr. Robert H. Moore. The dam is classified as small size with a significant hazard classification. The principal spillway is a 24-inch corrugated metal pipe drop-inlet that connects to a 15-inch corrugated metal pipe which passes through the dam at low level. The emergency spillway is an open channel cut at the left abutment. The reservoir is used for recreation and irrigation by the owner.

Based on criteria established by the Department of the Army, Office of the Chief of Engineers (OCE), the Spillway Design Flood (SDF) is the 100 year flood. The spillways will pass 24 percent of the PMF or 100 percent of the SDF without overtopping the crest of the dam. The spillway is adjudged as adequate.

The visual inspection revealed no problems in need of immediate attention. A stability check is not required. Maintenance is performed by the owner. However, there is no regular maintenance operations program or warning system. It is recommended that a regular maintenance and operations program be instituted with provisions for records of all maintenance performed. It is also recommended that a warning system be established and that the maintenance items listed Section 7.2 be accomplished as part of the regular maintenance program within the next 12 months.

Submitted By:

Original signed by
JAMES A. WALSH

JAMES A. WALSH, P. E.
Chief, Design Branch

Recommended By

Original signed by
JACK G. STARR

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Approved:

Original signed by:
Douglas L. Haller

DOUGLAS L. HALLER
Colonel Corps of Engineers
District Engineer

Date: MAY 29 1981

DAM

RESERVOIR

OVERALL VIEWS
MOORE DAM
26 FEBRUARY 1981

SECTION 1

PROJECT INFORMATION

1.1 GENERAL:

1.1.1 Authority: Public Law 92-367, 8 August 1972, authorized the Secretary of the Army, through the Corps of Engineers to initiate a National Program of Safety Inspections of Dams throughout the United States. The Norfolk District has been assigned the responsibility of supervising the inspection of dams in the Commonwealth of Virginia.

1.1.2 Purpose of Inspection: The purpose is to conduct a Phase I inspection according to the Recommended Guidelines for Safety Inspection of Dams (Reference 1, Appendix IV). The main responsibility is to expeditiously identify those dams which may be a potential hazard to human life or property.

1.2 Project Description:

1.2.1 Dam and Appurtenances: Moore Dam is an earthfill embankment about 400 feet* long and 22.7 feet** high. The crest of the dam is 12 feet wide and traversed by an unpaved private roadway with access via the emergency spillway. The dam crest elevation rises uniformly from each abutment to a maximum elevation of 106.9 TBM*** at the center of the dam. The upstream slope is 2.5 horizontal to 1 vertical (2.5H:1V) above the waterline. The downstream slope is 2.5H:1V also.

The principal spillway is an ungated 24-inch corrugated metal pipe (CMP) located about 5 feet into the reservoir. The vertical 24-inch CMP connects to a 15-inch CMP which passes through the dam at a low level and discharges at the toe of the dam. There is a one foot section of 42-inch diameter CMP serving as a trash guard. The trash guard is supported by three metal fingers which rest upon the principal spillway crest.

* Dam length is measured from natural ground at the left abutment to natural ground at the right abutment. The width of the emergency spillway is not considered part of the dam length.

** Dam height is based on the difference in elevation between the streambed at the toe of the dam and the maximum height on the crest.

*** The crest of the drop-inlet is the temporary bench mark (TBM) at elevation 100.0.

The emergency spillway is an open channel cut at the left abutment. The emergency spillway control section is about 20 feet with a minimum crest elevation of 101.8.

1.2.2 Location: Moore Dam is located approximately one mile southwest of Bachelors Hall which is 10 miles west of Danville, Virginia on Route 58.

1.2.3 Size Classification: The dam is classified as a small size structure on the basis of its height.

1.2.4 Hazard Classification: There is a mobile home, an uninhabited outbuilding, and a state road in the area immediately downstream from the dam, such that its failure could endanger lives and cause economic losses. Therefore, a significant hazard classification is given to the structure according to guidelines contained in Section 2.1.2 of Reference 1, Appendix 1V. The hazard classification used to categorize this dam is a function of location only and has nothing to do with its stability or probability of failure.

1.2.5 Ownership: Moore Dam is owned by Mr. Robert H. Moore.

1.2.6 Purpose: The dam is used for irrigation and recreation by the owner.

1.2.7 Design and Construction History: The dam was designed with assistance from the U. S. Department of Agriculture, Soil Conservation Service. Limited design information was available for evaluation. The data is included in Appendix I. Construction of the dam was completed in 1974.

1.2.8 Normal Operational Procedures: Water passes automatically through the principal and emergency spillways as the reservoir rises above the principal spillway intake riser and the emergency spillway crest.

1.3 Pertinent Data:

1.3.1 Drainage Area: The dam controls a drainage area of 0.464 square miles.

1.3.2 Discharge at Dam Site: Maximum flood -unknown.

Pool level at lowest on dam crest of (elevation 105.5):

Principal Spillway	26 cfs
Emergency Spillway	2488 cfs

1.3.3 Dam and Reservoir Data: Pertinent data on the dam and reservoir are shown in the following table:

TABLE 1.1 DAM AND RESERVOIR DATA

Item	Elevation feet TBM	Area (Acres)	Reservoir Capacity		Length, (miles)
			Acre-feet	Watershed, Inches	
Top of Dam					
Highest Point	106.9	13.9	115.0	4.6	.42
Lowest Point	105.5	11.5	90.0	3.6	.34
Emergency Spillway Crest	101.8	6.5	60.0	2.4	.23
Principal Spillway Crest	100.0	5.1	45.0	1.8	.19
Stream Bed at Toe of Dam	84.2	---	---	---	---

SECTION 2

ENGINEERING DATA

2.1 Design: The Soil Conservation Service provided design assistance for the dam. Copies of the initial soil investigation, estimated of watershed discharge, and a suggested dam cross section were available (Appendix I).

2.2 Construction: There are no known construction records.

2.3 Evaluation: The information available is insufficient to properly evaluate foundation and embankment stability.

SECTION 3

VISUAL INSPECTION

3.1 Findings:

3.1.1 General: The results of the inspection on February 26, 1981 are recorded in Appendix III. At the time of the inspection, the weather was sunny and clear, with a temperature of 50°F. Ground conditions were moist. The reservoir elevation was at 100 feet TBM. The principal spillway consists of a 15-inch corrugated metal pipe (CMP) through the embankment, with a riser 24 inches in diameter serving as the intake and a 15-inch CMP as the outlet. The emergency spillway is an earthen channel located in the left abutment. Flow was passing through only the principal spillways at the time of the inspection. The tailwater elevation was 85.2 feet TBM. There are no known prior inspection reports.

3.1.2 Embankment: A sketch of the embankment showing a cross section and crest profile is provided on Plate II, Appendix I. A plan view is given on Plate III, Appendix I.

The embankment is in good condition. There are no signs of surface cracks, unusual movement, or misalignment. A wet area approximately 15 feet by 20 feet was observed just beyond the toe of the dam left of the principal spillway outlet. Additionally there is a small slough in the stilling basin bank to the right of the principal spillway outlet.

There are two broad shallow erosion gullies on the upstream edge of the dam crest. The road surface along the crest is earth with very sparse grass cover between farm implement tracks. Access to the crest is via the earthen channel emergency spillway. The midpoint of the dam crest between the two abutments is higher than the abutments. There is minor erosion from wave action because there is no riprap on the upstream face of the embankment. The upstream face above the normal water line, and the downstream face have a sparse grass cover with mixed hardwood and pine trees growing overall. Some of the trees have trunk diameters of 3 inches. No foundation drains were observed.

3.1.3 Principal Spillway: The principal spillway intake consists of a 24-inch corrugated metal pipe riser. The trash guard is a one foot section of 42-inch CMP supported by three metal fingers atop the 24-inch CMP riser crest. The riser is connected to a 15-inch CMP passing through the embankment at a low level and discharging into the stilling basin at the toe of the dam. There was no reservoir drawdown capability observed.

3.1.4 Emergency Spillway: The emergency spillway is a 90-feet wide (including side slopes) earthen channel with a control section which is approximately 20 feet wide located in the left abutment. There is a roadway in the emergency spillway outlet channel that provides access to the dam crest. The roadway begins at the spillway discharge and runs longitudinally to the control section (the smallest cross-sectional area) at which point the road turns up to the crest. The unprotected road surface has caused erosion along the entire length of the emergency spillway discharge channel. The discharge channel has numerous small erosion gullies, bare spots, scattered brush and small pine trees, and intermittent clusters of tall grasses. The approach channel also has a cover of small pine trees, clusters of tall grasses, and bare spots.

3.1.5 Instrumentation: There is no instrumentation on this dam.

3.1.6 Reservoir Area: The slopes of the watershed are mild, variously covered with woods and cropland. There are no signs of reservoir slope failure. There is minor shoreline erosion. Sedimentation in the reservoir was not observed.

3.1.7 Downstream Channel: The channel immediately below the dam is overgrown with trees and underbrush. Beyond this obstructed area is a picnic area. The stream continues with a natural wooded streambed through terrain characterized by mild slopes.

3.1.8 Stilling Basin: The stilling basin was small with very steep side slopes. There was a slough to the right side of the outlet. These side slopes were not protected by riprap.

3.2 Evaluation: Overall, the dam appears to be in good condition. However, the inspection revealed certain preventive maintenance items which should be scheduled as part of an annual maintenance program. These are:

a. Fill and compact the erosion gullies on the upstream edge of dam crest. These areas should also be seeded.

b. Maintain the roadway with adequate surface material (2-inches of gravel) to prevent rutting, with particular attention given to the section within the emergency spillway.

c. Cut trees and underbrush on the dam, including the emergency spillway, and keep the embankment and spillway mowed to maintain grass cover and prevent the encroachment of underbrush. Seed any bare areas exposed by the cutting of existing vegetation. All trees with diameters greater than three inches should have the root ball and root structure removed also. All subsequent holes should be filled with well compacted soil and these areas should be seeded or sodded.

d. Clear underbrush from the outlet area and from the channel below it so that the flow of water is not obstructed.

e. Dress up the erosion gullies within the emergency spillway discharge channel to prevent the progressive erosion of the channel and hillside.

f. Install a staff gage, which is a staff, rod, or post with elevations indicated on it permanently mounted in a lake to show the depth of the water. It should be of sufficient height to indicate the depth of flow through the emergency spillway.

g. Fill the slough right of the principal spillway outlet and place riprap on the banks of the stilling basin to protect them from erosion.

h. The wet spot left of the principal spillway outlet should be monitored for any increase in flows.

SECTION 4

OPERATIONAL PROCEDURES

4.1 Procedures: The normal storage pool elevation is about 100.0 feet TBM, which is the elevation of the crest of the 24-inch riser intake for the principal spillway. Water passes automatically over the crest of the intake riser as the water level in the reservoir rises. Ultimately water will pass through the emergency spillway when the lake level rises above the elevation of its crest.

4.2 Maintenance: General maintenance work is performed at the dam as the need arises.

4.3 Warning System: At present time, there is no warning system or evacuation plan for Moore Dam.

4.4 Evaluation: The dam does not require an elaborate operation and maintenance program. However, a program should be initiated to help detect and correct any problems that might occur. An annual maintenance program should be established which includes but is not limited to the constant monitoring of any wet areas as well as seasonal activities such as mowing and clearing.

An emergency operation and warning plan should be developed, to include:

a. How to operate the dam during an emergency.

b. Who to notify, including public officials, in case evacuation from the downstream area becomes necessary.

The local Emergency Services Coordinator of the State Office Energy and Emergency Services can assist in the preparation of an Emergency Warning Plan.

SECTION 5

HYDRAULIC/HYDROLOGIC DATA

5.1 Design: The SCS design worksheet entitled "Peak Rates of Discharge from Small Watersheds" showing the design 25 year peak discharge was available. The peak 25-year discharge was shown to be 176 cfs.

5.2 Hydrologic Records: None were available.

5.3 Flood Experience: Unknown.

5.4 Flood Potential: The 100 year, 1/2 PMF and PMF were developed by use of the HEC-1 computer program (Reference 2, Appendix IV and routed through the reservoir by use of the NWS-Dambreak computer program (Reference 3, Appendix IV). Clark's Tc and R coefficients for the local drainage area were estimated from basin characteristics. The appropriate rainfalls applied to the developed unit hydrograph were obtained from National Weather Service publications (Reference 4 and 5, Appendix IV).

5.5 Reservoir Regulation: Pertinent dam and reservoir data are shown in Table 1.1.

Water passes automatically through the principal and emergency spillways as water rises above their crests.

The storage curve was developed based on areas obtained from a U. S. Geological Survey Quadrangle Map. Rating curves were developed for the spillways. In routing hydrographs through the reservoir, it was assumed that the initial pool elevation was at 100 T.B.M.

5.6 Overtopping Potential: The probable rise in the reservoir and other pertinent information on reservoir performance is shown in Table 5.1.

5.7 Reservoir Emptying Potential: An eight-inch shear gate outlet at elevation 640.0 at the upstream toe of the dam is available for dewatering the reservoir. The outlet will permit withdrawal at about 5.0 cfs with the reservoir at normal pool and essentially dewater the reservoir in about 11 days. This is equivalent to an approximate drawdown rate of 0.91 feet per day based on the hydraulic height measured from normal pool divided by the time to dewater the reservoir.

5.8 Evaluation: Based on the size (small) and hazard classification (significant) the recommended Spillway Design Flood is the 100-year to 1/2 PMF. Based on the risk involved, the 100 year flood has been selected as the SDF. The emergency spillway will pass 24 percent of the PMF or 100 percent of the SDF without overtopping the dam. Therefore, the spillway is adjudged as adequate.

Conclusions pertain to present day conditions. The effects of future development on the hydrology has not been considered.

Table 5.1 RESERVOIR PERFORMANCE

Item	Normal Flow	Hydrograph 100 Year 2/	1/2 PMF	PMF 1/
Peak flow c.f.s.				
Inflow	.5	911	2056	4112
Outflow	.5	941	1956	3940
Maximum Elevation				
Feet, TBM	100.0	104.8	106.5	107.4
Non-Overflow Section (Elevation 105.5) 3/				
Depth of Flow, Feet	-	-	1.0	1.9
Duration, hours	-	-	1.5	2.9
Velocity, fps 4/	-	-	4.6	6.4
Tailwater Elevation	-	-	-	
Feet, TBM	85.2	-	-	-

1/ The PMF is an estimate of flood discharges that may be expected from the most severe combinations of critical meterologic and hydrologic conditions that are reasonably possible in the region.

2/ The 100-year flood has one chance in 100 of being exceeded in any given year.

3/ Lowest point on dam crest.

4/ Critical velocity.

SECTION 6

DAM STABILITY

6.1 Foundation and Abutments: The Moore Dam is located in an area underlain by sedimentary rocks of Triassic Age within the Piedmont physiographic province. These Triassic sedimentary rocks include shales, sandstones, and conglomerates of continental origin.

No evidence of a foundation drainage system was observed at the time of the inspection, and the design information provided by the Soil Conservation Service did not indicate one. The cross section sketch provided by S.C.S. indicates a cutoff trench 12 feet wide. A depth for the cutoff trench is not given. Mr. Moore indicated that care was taken to locate appropriate material from which to construct the dam, and presumably the contractor would have used the more clayey materials available on the site, particularly for the cutoff trench.

The soils in the vicinity of the dam site are typically residual soils formed from the underlying rock. The depth of the surface layer and the zone of weathered rock may be relatively deep in the area, so it is likely that the dam rests on residual or soft weathered parent material, rather than on hard bedrock. However, the clayey nature of the soils at the site is such that they would tend to provide a highly imperious foundation material.

The clays here are of medium to high compressibility and of medium to high susceptibility to volume changes with moisture variations, hence excessive settlement can be a problem in construction activities. However, the potential problems, which may be caused by these characteristics, can be largely alleviated if reasonable care is taken during the construction process to minimize the disturbance of excavated areas prior to the placement of fill material and to avoid undue wetting of foundation areas and material to be used as fill. The dam appears to have been constructed in a satisfactory manner, and the inspection revealed no evidence of deficiencies related to its foundation or abutments.

6.2 Embankment:

6.2.1 Materials: Information provided by S.C.S. included boring logs for six soil borings made at the dam site. These are presumably hand auger borings, as the maximum depth is 36 inches. The soil profiles revealed by these borings show a predominance of silt, silty clay loam, and clay loam, under the Soil Taxonomy system of classification used by the Soil Conservation Service. The location plan for these borings does not indicate specific borrow areas, but probably much of the material was taken from the area presently covered by the lake and the emergency spillway. The owner indicated that the hillside along the left shoreline proved to be a favorable borrow area.

On the basis of a review of the S.C.S. data and observations made during the inspection, the area soils would be classified, under the Unified classification system, as clays and silty clays of medium to high plasticity. The dam is considered to be homogeneous, or constructed of similar materials throughout.

6.2.2 Stability: There were no stability calculations available. The dam is 22.8 feet high with a crest width of 12 feet. The upstream slope is 2.5H:1V and the downstream 2.5H:1V. The dam was designed for a normal pool elevation of 100.0 TBM. The maximum storage pool is 101.9, the elevation of the emergency spillway. The upstream slope has never experienced a rapid drawdown, although it would be subject to one if the eight-inch shear gate outlet were opened, as the rate of drawdown would be 0.91 feet per day, somewhat greater than the 0.6 feet per day recommended as the maximum rate of drawdown. The dam has been subjected to the maximum control storage pool (water at the crest of or flowing through the emergency spillway) on several occasions, with no ill effects other than possible erosion to the emergency spillway channel. Actually erosion damage in the emergency spillway area is probably largely the result of surface runoff and vehicle traffic, in view of the infrequency of spillway flows.

According to the guidelines presented in Design of Small Dams, U. S. Department of the Interior, Bureau of Reclamation, the slopes recommended for a homogeneous small dam of similar material subjected to a rapid drawdown are 3.5H:1V upstream and 2.5H:1V downstream. The recommended crest width for this height is 14.5 feet. Based on these guidelines, the Moore Dam has an adequate downstream slope, and inadequate upstream slope, and a crest width a few feet less than desirable.

6.2.3 Seismic Stability: The dam is located in Seismic Zone 2. Therefore, according to the Recommended Guidelines for Safety Inspection of Dams, the dam is considered to have no hazard from earthquakes provided static stability conditions are satisfactory and conventional safety margins exist.

6.3 Evaluation: There is insufficient information to completely evaluate the stability of the dam. However, the visual inspection revealed no apparent instability. Based on the visual inspection, the foundation is considered sound. Based on the Bureau of Reclamation guidelines, the downstream slope is adequate and the crest width and upstream width are inadequate. There is no seepage on the downstream face above the toe of the dam or evidence of other problems stemming from the narrowness of the crest or the steepness of the upstream slope. The steepness of the upstream slope would possibly be a problem if the low level gate outlet were to be opened, as the greater than optimum drawdown could conceivably precipitate a failure of the upstream slope. Although such a failure would necessitate some repair work, it is unlikely that it would cause a complete breach of the dam,

as at the time of its likely occurrence, the pool level would be relatively low. The embankment is considered stable in both its normal pool and maximum storage pool operations. In addition, overtopping is not a problem, as the dam will not be overtopped by the spillway design flood (100-Year Flood). Stability calculations are not required.

SECTION 7

ASSESSMENT/REMEDIAL MEASURES

7.1 Dam Assessment: Engineering data was not available to adequately assess the condition of the dam. The visual inspection revealed no findings that proved the dam to be unsound. Overall, the dam is in good condition. There is no regular maintenance operations program formalized and no emergency operation and warning plan. Corps guidelines indicate the appropriate Spillway Design Flood (SDF) for this dam (small size and significant hazard) is the 100 year flood. The spillway will pass 24 percent of the PMF and 100 percent of the SDF without overtopping the dam. Therefore the spillway is adjudged as adequate.

A stability check of the dam is not required.

7.2 Recommended Remedial Measures: It is recommended that the regular maintenance operations program be formalized for future reference. A formal emergency procedure should be prepared and furnished to those responsible for maintaining the dam in a safe condition. This should include how to operate the dam during an emergency, and who to notify, including public officials in case evacuation from the downstream area is necessary. The local Emergency Services Coordinator of the State Office of Energy and Emergency Services can assist in the preparation of an Emergency Warning Plan. Also, the inspection revealed the following maintenance items that should be scheduled by the owner during a regular maintenance period within the next 12 months:

a. All trees and saplings and underbrush on the upstream and downstream faces of the dam and emergency spillway should be cut even with the ground to prevent the eventual deterioration of the dam by root systems. All trees with diameters greater than three inches should have the root ball and root structure removed. The subsequent holes should be filled with well compacted soil and then seeded or sodded.

b. Eroded areas on the upstream face and dam crest should be filled with compacted soil and seeded.

c. Maintain roadway across the crest of the dam and within the emergency spillway with adequate surface (2-inches of gravel) material to prevent rutting, with particular attention given to the emergency spillway.

d. Monitor upstream face for erosion and make repairs as it becomes necessary.

e. Continue mowing the dam area to maintain the grass cover and prevent the encroachment of underbrush. Any bare areas exposed by the initial cutting and clearing should be seeded to establish good cover.

f. Dress up the erosion gullies in the emergency spillway channel to prevent progressive erosion of the discharge channel and hillside. The eroded material should be replaced, compacted, and seeded.

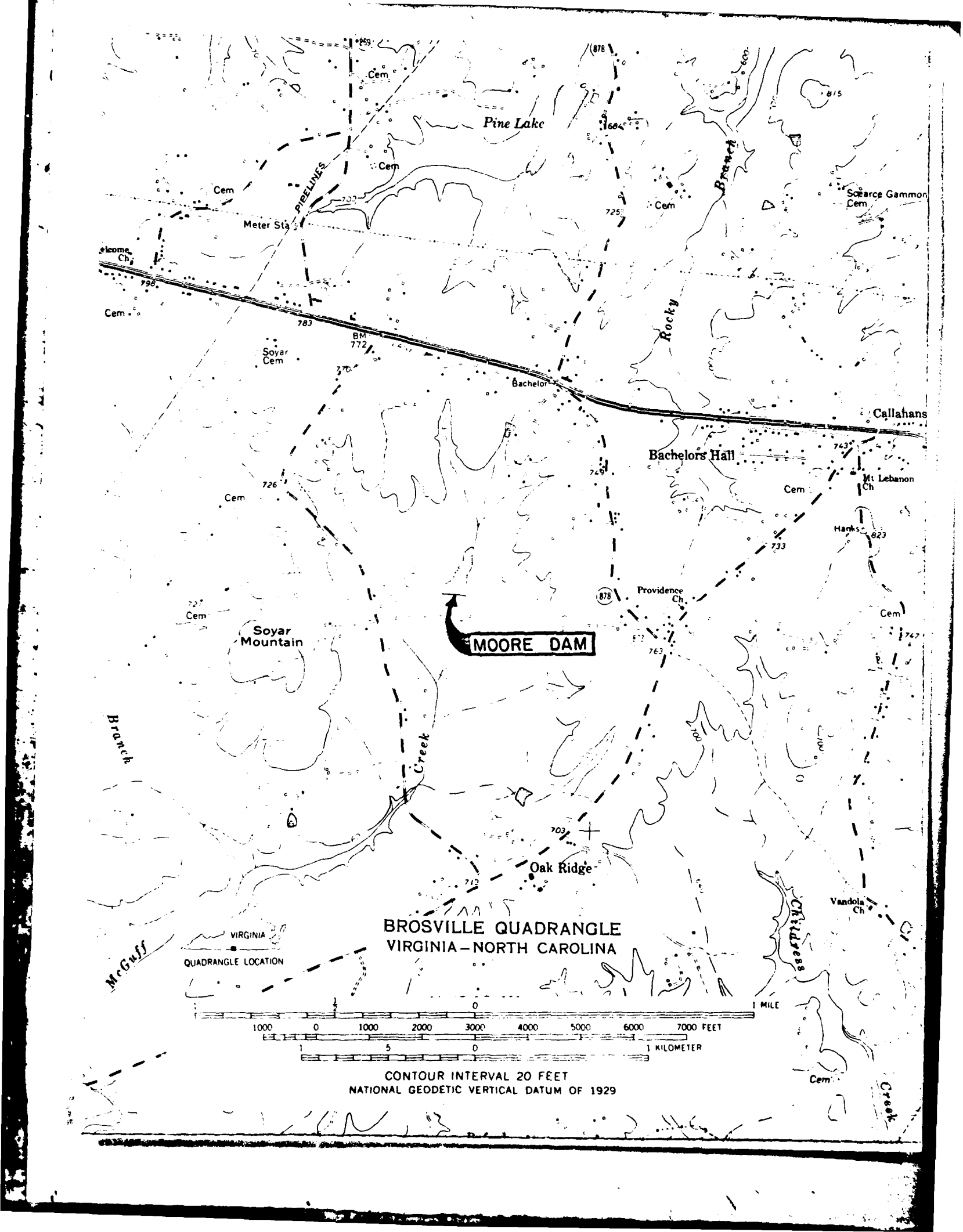
g. Install a staff gage, which is a staff, rod, or post with elevations indicated on it permanently mounted to show the depth of the water. It should be of sufficient height to indicate the depth of flow through the emergency spillway.

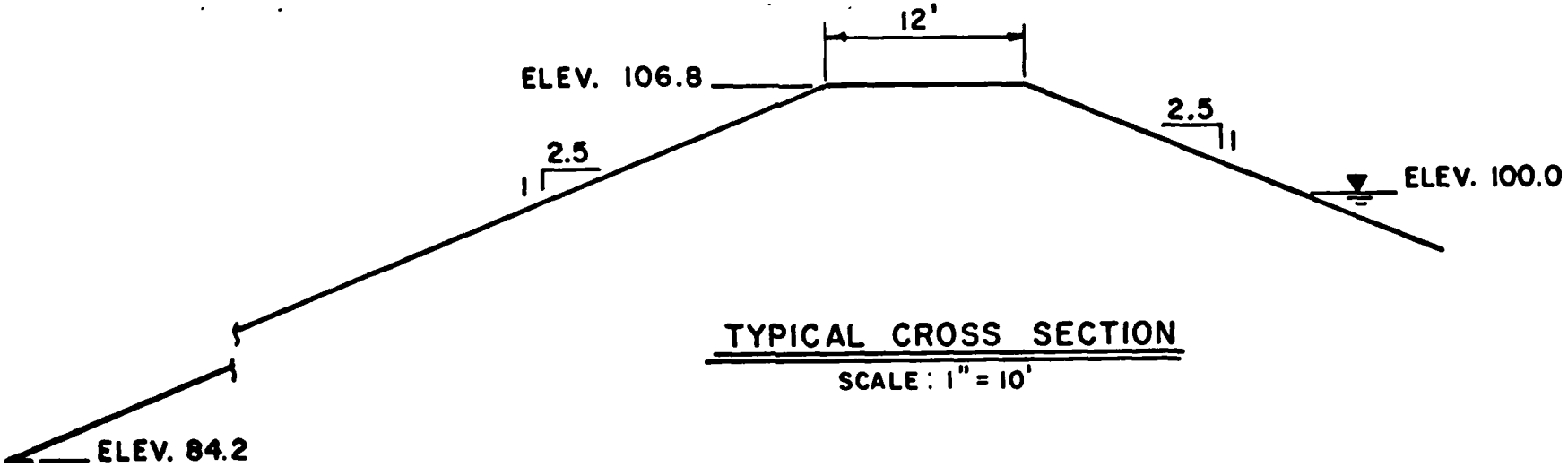
h. Place riprap around the banks of the stilling basin to protect them from erosion. Fill the sloughed area to the right of the emergency spillway.

i. Monitor the wet area just beyond the toe of the dam left of the principal spillway outlet for any increase in flow.

APPENDIX I

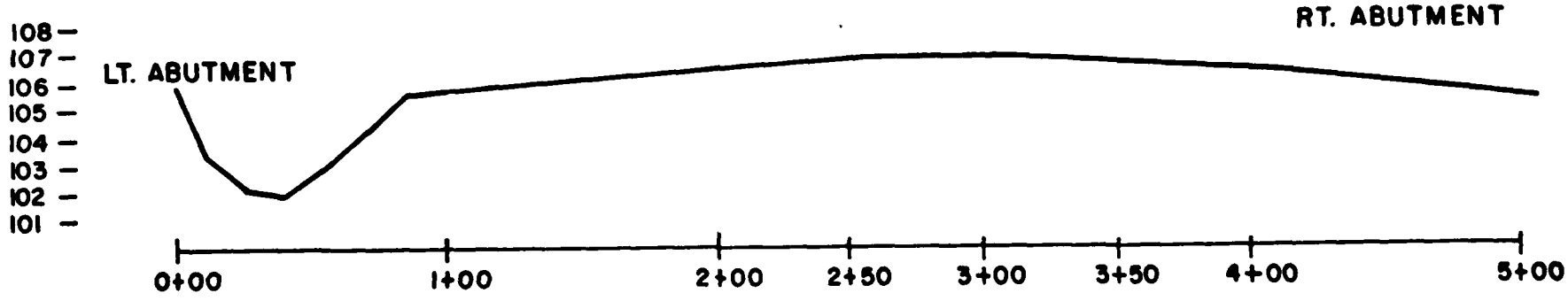
MAPS AND DRAWINGS


Pine Lake
PIPELINES
Meter Sta
Cem
Soyar Cem
BM 772
Bachelor
Rocky Branch
Scearce Gammon Cem
Callahans
Bachelors Hall
Mt Lebanon Ch
Hanks
Providence Ch
MOORE DAM
Soyar Mountain
Oak Ridge
Vandola Ch
Childress Creek
McGuff Branch Creek
BROSVILLE QUADRANGLE
VIRGINIA – NORTH CAROLINA
VIRGINIA
QUADRANGLE LOCATION
1 MILE
1000 0 1000 2000 3000 4000 5000 6000 7000 FEET
1 KILOMETER
CONTOUR INTERVAL 20 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929



TYPICAL CROSS SECTION

SCALE : 1" = 10'



PROFILE ALONG CREST

SCALE: VERT. 1"=60'
HORZ. 1"=60'

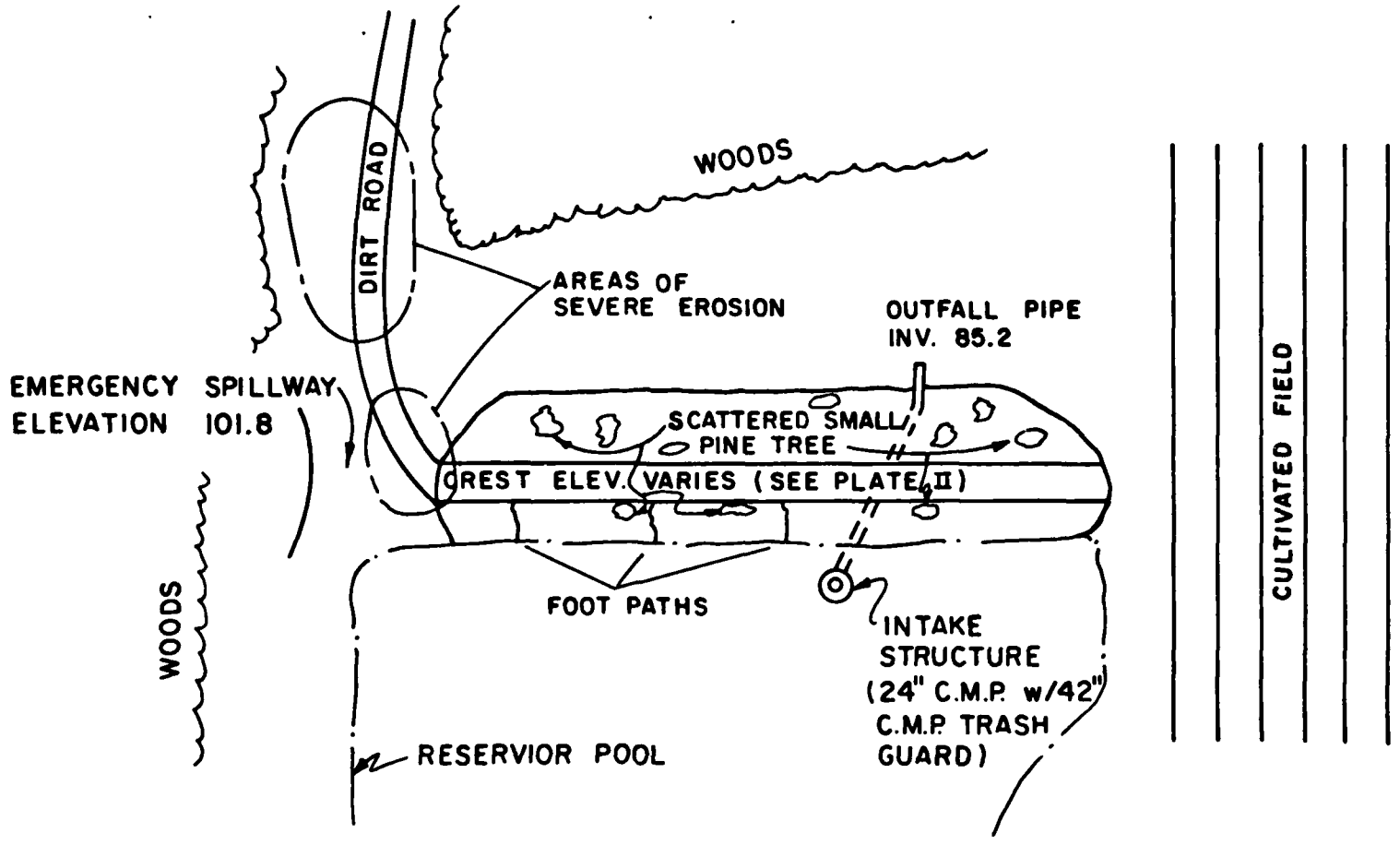
NOTES

1. SKETCH MADE FROM FIELD NOTES.

2. ELEVATIONS BASED ON TBM OF WATER SURFACE (AT PRINCIPAL SPILLWAY) EQUAL TO 100 FEET.

MOORE DAM
PITTSYLVANIA COUNTY
26 FEBRUARY 1981
D. DAVIS

PLATE II



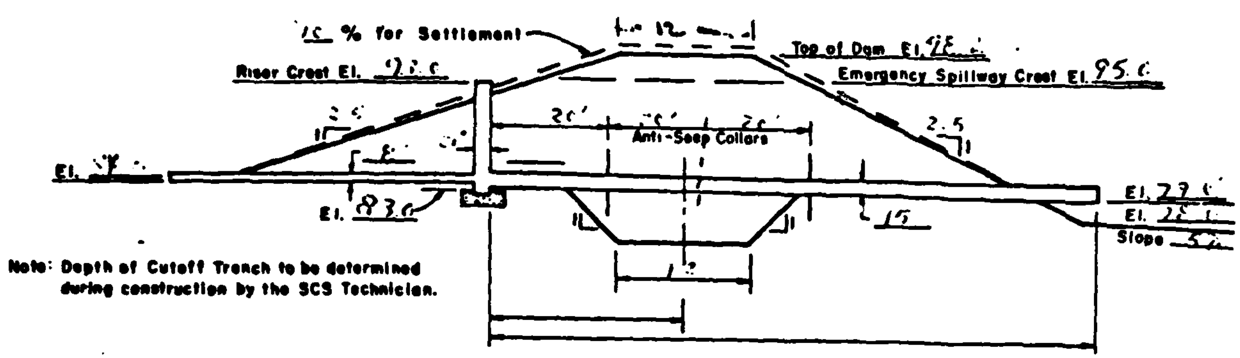
NOTES

1. SKETCH MADE FROM FIELD NOTES.

2. ELEVATIONS BASED ON TBM OF WATER SURFACE (AT PRINCIPAL SPILLWAY) EQUAL TO 100 FEET.

MOORE DAM
PITTSYLVANIA COUNTY
26 FEBRUARY 1981
D. DAVIS

PLATE III



℄ STA 0+00

PROFILE ALONG ℄ PIPE SPILLWAY

Bottom Width: 20 Side Slopes: 3:1
Outlet Channel Grade max.: 3.7 % min.: 2.5 %

PROFILE ALONG ℄ EARTH SPILLWAY (Veg.)

(Show Emb., Pool Area, Earth Spillway, Borrow Area, Fence Locations, Livestock Water Pipe & Tank Location)

Bench mark ... 40' W of west end of the dam Elev. 100.0

ESTIMATED QUANTITIES		
QUAN.	UNIT	ITEM
1	21" × 15" × 8'	[illegible]
1	20'	[illegible] pipe 8" dia.
4	20'	[illegible] 15" dia.
1	[illegible]	[illegible] 15" dia.
5	15"	dia. connecting bands
2	8"	dia. connecting bands
1	21"	dia. connecting band
1	[illegible]	[illegible]
3	[illegible]	[illegible]
1	42'	[illegible]

SEEDING 1.0 Acres		
MATERIALS	RATE	LBS.
Seed Ky-31 Fescue		60
Fertilizer	5-10-10	1000
Lime	2 Tons	4000
Mulch	1 Ton	2000
Seeding Period ____ to ____		

LEGEND

- Roadway
- House
- Water Course
- Property Line
- Dam & Reservoir

PLATE IV

SCS-538
10-56

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL INVESTIGATION TO DETERMINE SUITABILITY OF PROPOSED POND SITE

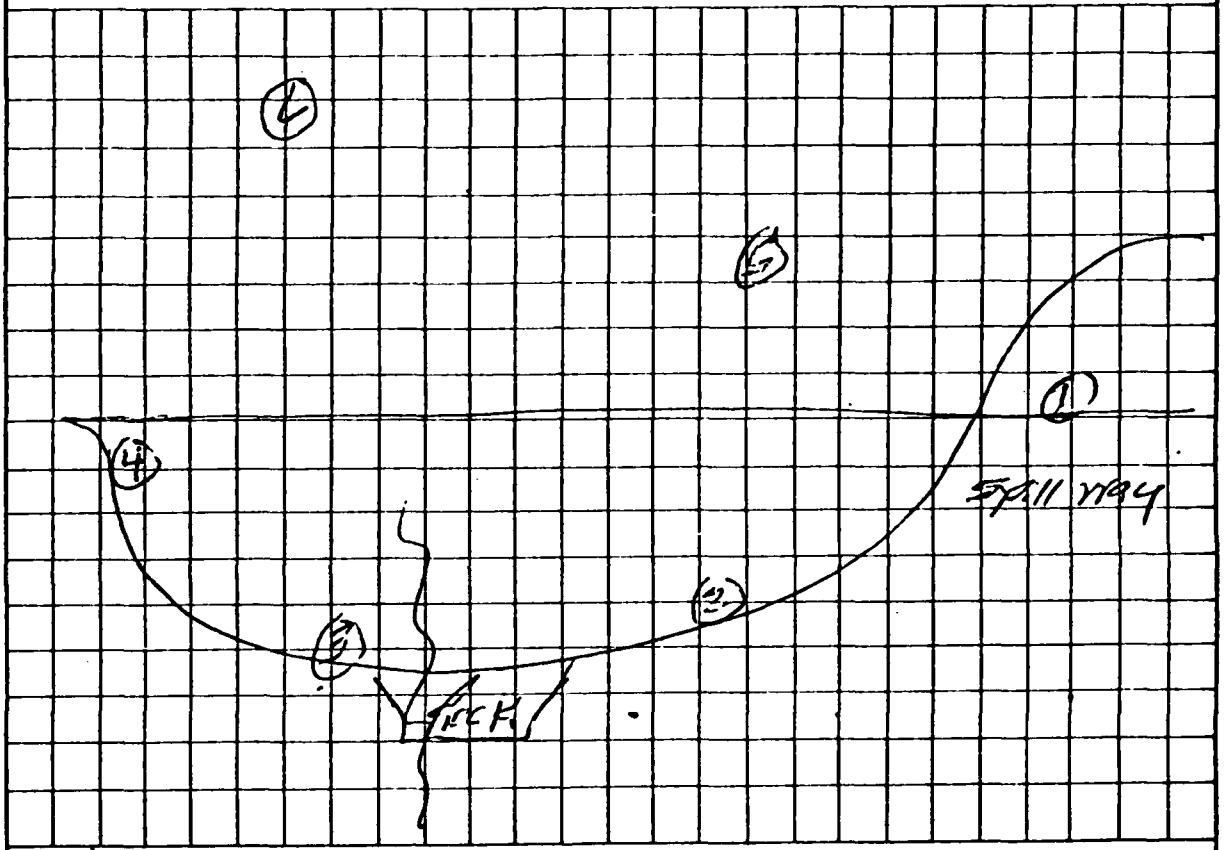
FARMER'S NAME R. H. Moore — DISTRICT T. H. Sullivan
DATE 8/12-14 — COUNTY T. H. Sullivan
S. C. S. PHOTO SHEET NO. _____ — WORK UNIT Cottageville

WATERSHED AREA MEASUREMENTS
CROPLAND 40 ACRES PASTURE 5 ACRES
WOODLAND 24½ ACRES TOTAL 71 ACRES

POND CLASS: III

WORK UNIT CONSERVATIONIST: Russell Vaughn IV

SKETCH OF PROPOSED POND SHOWING WHERE BORINGS WERE MADE (Approx. scale 1" = _____ feet)
Locate reference point on center line of dam and identify on sketch.



SHOW DEPTH SCALE

BORING NUMBER AND PROFILE
Make and list dam-site and spillway borings first - then ponded area and borrow pit borings - separate with vertical red line.
(Continued on back where necessary) Show water table elevations on dam-site borings.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
0-12"	L	SiL	SiL	CL	SiL																		
12-24"	CL	CL	SiL																				
36"	CL	SCL	CL																				

BORINGS MADE BY Hayes & Moore SIGNATURE & TITLE Core Leads

PLATE V

RTSC-NE-ENG-230
Feb. 1970

U. S. Department of Agriculture
Soil Conservation Service

PEAK RATES OF DISCHARGE FROM SMALL WATERSHEDS

State Virginia
County Pittsylvania
Cooperator R.H. Nocl-e
Community Bachelor Hall

Sheet No. 1 of 4
Field No.
Computed by O.B. Hogan Date 7/17/74
Checked by Date

Drainage Area is 360 Acres.
Rainfall Freq. is 25 Years.

Rainfall Depth is 6' Inches.
Avg. Watershed Slope is 6 Percent.

Hydrologic Soil Group 1	Land Use 2	Treatment or Practice 3	Hydrologic Condition 4	Runoff Curve Number 5	Area (Ac.) 6	Col. 5. X Col. 6 7
B.	Woods		Good	55	248	13640
	Crops		S. Row	81	40	3240
	Road		H. Surface	84	5	420
12	Lots	½ AC	Good	70	7	490
				TOTALS =	300	17790

Weighted Runoff Curve No. = $\frac{\text{Total Col. 7}}{\text{Total Col. 6}} = \frac{17790}{300} = 59.3$; Use 60

Q_1 (For 60 RCN_1) = Q(ES 1027 for Mod slopes) x Slope Correction Factor (Ex. 2-0)
= 160 x 1.10 = 176.0 cfs

Q_2 (For ___ RCN_2) = ___ x ___ = ___ cfs

Watershed RCN Minus RCN_1	C
1	.2
2	.4
3	.6
4	.8

$Q_2 - Q_1$ = ___ - ___ = ___ cfs

$\Delta Q = (Q_2 - Q_1) \times C$ = ___ x ___ = ___ cfs

Peak Discharge = $Q_1 + \Delta Q$ = ___ + ___ = 176 cfs

Runoff = ___ Inches (Exhibit 2-7A) 2.7(1)

NOTE: Q_1 and Q_2 above refer to runoff resulting for RCN's to nearest 5 (60, 65; 65, 70, etc.). If computed RCN ends in 0 or 5 (60, 65, 70, etc.), Q_2 and the next three lines will not be needed. In this case, Q_1 runoff will be the Peak Discharge.

Runoff Data Sheet

USDA SCS HYATTSVILLE MD 1972

PLATE VI

APPENDIX II

PHOTOGRAPHS

PHOTO #1 CREST OF DAM

PHOTO #2 UPSTREAM FACE

PHOTO #3 DOWNSTREAM FACE

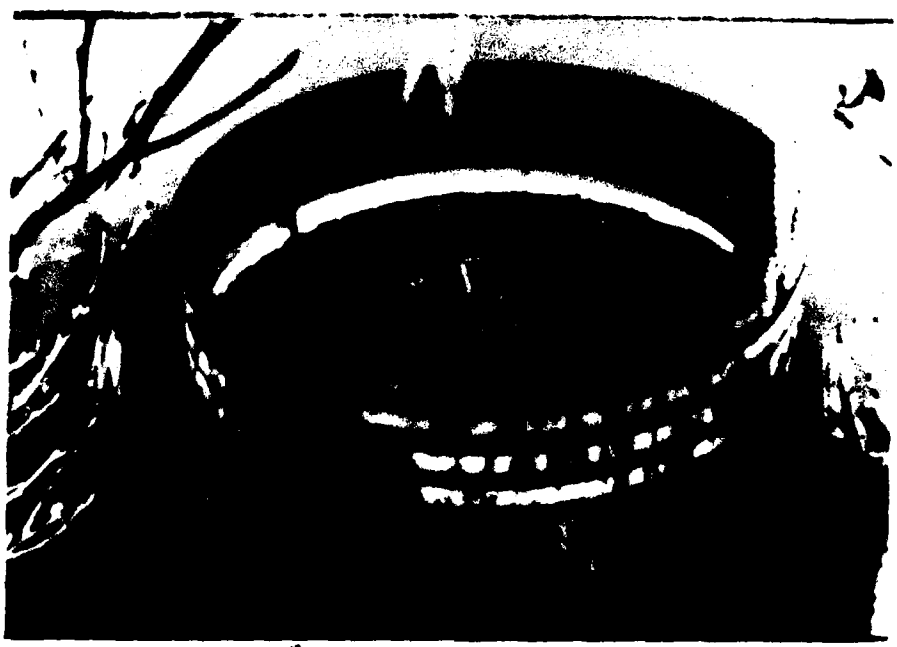


PHOTO #4 PRINCIPAL SPILLWAY
INTAKE STRUCTURE

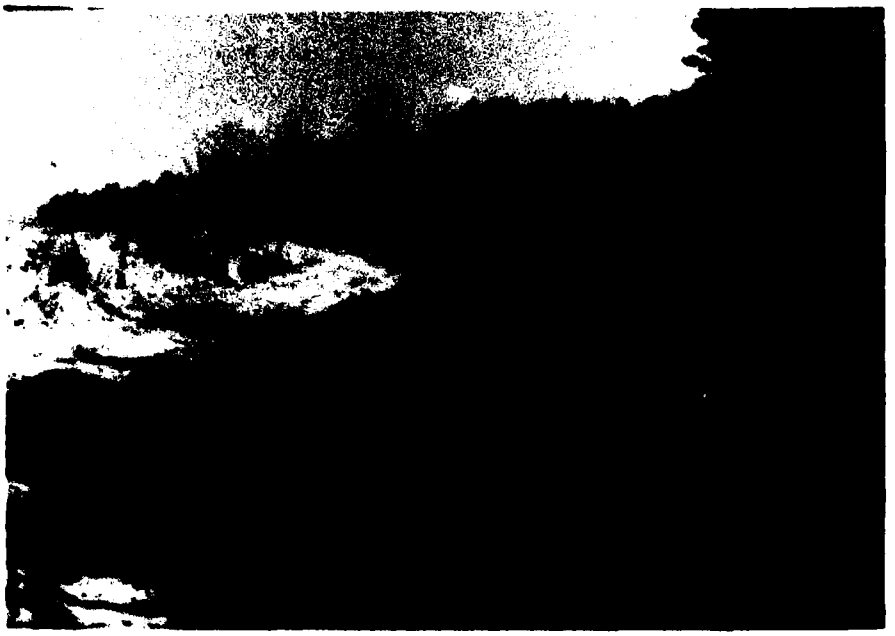


PHOTO #5 EMERGENCY SPILLWAY (EMS)

PHOTO #6 EMS DISCHARGE CHANNEL

APPENDIX III

FIELD OBSERVATIONS

Check List
Visual Inspection
Phase I

Name Dam: Moore Dam County: Pittsylvania State: Virginia Coordinates: Lat. 136°35.8'
Long. 079°33.0'

Date(s) Inspection: 26 Feb 1981 Weather: Clear Temperature: 50°

Pool Elevation at Time of Inspection: Appendix I Tailwater at Time of Inspection: Appendix I

Inspection Personnel:

Bo Taran, COE	Leon Musselwhite, SWCB	Robert H. Moore, Owner
Jim Robinson, COE	Hugh Gildea, SWCB	Robert H. Moore, Jr.
Dan Davis, COE	Ed Constantine, SWCB	
Leonard Jones, COE	Dave Bushman, SWCB	

Dave Bushman Recorders

EMBANKMENT

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SURFACE CRACKS	There were no signs of surface cracks.	None.
UNUSUAL MOVEMENT OR CRACKING AT OR BEYOND THE TOE	There were no signs of unusual movement.	None
SLOUGHING OR EROSION OF EMBANKMENT AND ABUTMENT SLOPES	There are two broad shallow erosion gullies on the upstream crest of the embankment. There is a small slough to the right of the principal spillway outlet that was probably caused by erosion of the stilling basin banks.	Fill erosion gullies and slough with compacted fill and reseed.
VERTICAL AND HORIZONTAL ALIGNMENT OF THE CREST	There were no signs of misalignment. The midpoint of the crest in between the two abutments is higher than either abutment. A dirt road with farm implement indentations traverses the crest of the dam.	This was probably done to account for settlement. Place stone or vegetation to stabilize roadway on crest.
RIPRAP FAILURES	There is no riprap on the upstream face of the embankment. There is also no riprap protecting the stilling basin from erosion.	Place riprap in the stilling basin.

EMBANKMENT

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
FOUNDATION	There is no evidence to suggest that the foundation is unstable.	None.
ANY NOTICEABLE SEEPAGE	There is a wet area 15 feet by 20 feet just beyond the toe of the dam to left of the principal spillway outlet.	This is probably due to either surface runoff of a rainstorm the day before or normal seepage. Monitor the area for any increase in flow.
DRAINS	No drains were observed.	None.
MATERIALS	Local soils used for the construction of the dam are silty clays and clays of medium to high plasticity.	None.
VEGETATION	Sparse grass cover. Mixed hardwoods and pines with diameters up to three inches scattered over the embankment, primarily pine tree.	Develop a good grass cover. Cut trees down to ground, and keep embankment mowed to maintain grass cover and prevent the encroachment of underbrush. All trees with diameters greater than three inches should have the root butt and root system removed The subsequent holes should be filled with well compacted soil and seeded or sodded.

PRINCIPAL SPILLWAY

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONTROL SECTIONS	None.	None.
INTAKE	Consist of a 24 in. CMP riser located near the center of the dam a short distance from the shore line. The trash guard consisted of 42 in. CMP 1 ft. higher than the crest of the intake.	None.
OUTLET	Consist of a 15 inch horizontal CMP. It discharges into a stilling basin of adequate size. There is a slough to the right of the outlet.	The slough is probably due to erosion of the stilling basin banks. The banks of the stilling basin should be protected from further erosion by riprap. Clear underbrush from outlet area and from channel below it so that the flow of water would not be obstructed.
BRIDGE AND PIERS	None.	None.
EMERGENCY GATE	None.	None.
GATES AND OPERATION EQUIPMENT	None.	None.

EMERGENCY SPILLWAY

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATION
CONTROL SECTIONS	Consist of an earthen side channel spillway 90 feet wide (including side slopes) with a control section which is approximately 20 feet wide, located in the left abutment. Sparse vegetation cover and some areas of erosion.	Develop a good grass cover and place compacted fill in the eroded areas and reseed.
APPROACH CHANNEL	Clear of major obstructions except for a few small pine trees and underbrush. Sparse vegetation.	Cut trees off at the ground and remove underbrush. Develop a good grass cover.
DISCHARGE CHANNEL	Clear of major obstructions except for a few small pine trees and underbrush. Sparsely vegetated with a dirt road following the course of the discharge channel to the crest. The unprotected road surface has caused erosion along the entire length of the EMS discharge channel. The discharge channel has numerous small erosion gullies bare spots scattered brush and small pine trees and intermittant clusters of tall grass.	None.
BRIDGE AND PIERS	None.	None.
MISCELLANEOUS	None.	None.

INSTRUMENTATION

VISUAL EXAMINATION	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
MONUMENTATION/SURVEYS	None.	None.
OBSERVATION WELLS	None.	None.
WEIRS	None.	None.
PIEZOMETERS	None.	None.
STAFFGAGES	None.	Install a staff gage, which is a staff rod or post with elevations indicated on it permanently mounted in a lake to show the depth of water. It should be sufficient height to indicate the depth of flow through the emergency spillway.
OTHER	None.	

RESERVOIR

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SLOPES	The slopes of the watershed are mild and well vegetated with woods and cropland. Minor shore line erosion does not present any special problems.	None
SEDIMENTATION	Sedimentation was not measured.	None.

DOWNSTREAM CHANNEL

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONDITION (OBSTRUCTIONS), DEBRIS, ETC.)	Initially heavily wooded opening into pasture land in a short distance.	None.
SLOPES	Gentle slopes.	None.
APPROXIMATE NO. OF HOMES AND POPULATION	There are two mobile homes located near the stream approximately 0.8 miles downstream.	None.

APPENDIX IV

REFERENCES

APPENDIX IV

REFERENCES

1. Recommended Guidelines for Safety Inspection of Dams, Office of the Chief of Engineers, Department of the Army, Washington, D. C.

2. HEC-1DB Flood Hydrograph Package, (Hydrologic Engineering Center, U. S. Army Corps of Engineers, September 1978.)

3. NWS-Dambreak Computer Model, (Office of Hydrology, National Weather Service (NWS), Silver Spring, Maryland, September 1980).

4. "Probable Maximum Precipitation Estimates, United States East of the 105th Meridian," Hydrometeorological Report No. 51, (U. S. Weather Bureau, June 1978).

5. "Rainfall Frequency Atlas of the Unites States", Technical Paper No. 40, (U.S. Weather Bureau, May 1961).

6. Geology of Salem Quadrangle, Virginia, by R. V. Amato, Virginia Division of Mineral Resources, 1974.

7. "Design of Small Dams", Technical Publication of United States Department of the Interior, Bureau of Reclamation, Second Edition, Revised Reprint, 1977.